

and eight to ten feet above the roof of the building on which the mast was placed. The curves of this diagram show that the indications of collectors as near to each other as these were will often give practically identical results. At the same time it should be observed that local differences may, and do exist. Arrangements are now being made for the establishment of a station at the Smithsonian Institution, so that comparative observations at somewhat greater distances may be made.

The Chief Signal Officer recognizes the fact that the subject of atmospheric electricity is involved in great obscurity, but he desires to place some of the results of the observations now under way in the hands of those interested in the subject as early as possible. Much is to be done in the way of systematic observation and investigation before any generalization will be possible.

#### OPTICAL PHENOMENA.

##### SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

*Alabama.*—24th.  
*Arizona.*—10th, 19th.  
*Arkansas.*—8th, 12th, 23d, 27th.  
*California.*—2d, 4th, 5th, 8th, 9th, 11th, 14th, 18th, 19th, 21st, 24th.  
*Colorado.*—26th, 29th.  
*Connecticut.*—11th.  
*Dakota.*—4th, 7th, 17th, 25th, 30th.  
*District of Columbia.*—29th.  
*Florida.*—3d, 4th, 10th, 11th, 12th, 28th.  
*Georgia.*—3d, 11th, 17th, 25th, 27th.  
*Idaho.*—4th, 5th, 6th, 26th.  
*Illinois.*—3d, 4th, 6th to 9th, 12th, 14th, 21st, 23d, 26th, 28th.  
*Indiana.*—4th, 5th, 10th, 14th, 22d, 24th, 26th.  
*Iowa.*—5th to 8th, 16th, 17th, 22d, 24th, 27th.  
*Kansas.*—4th, 7th, 10th, 23d, 26th, 29th.  
*Kentucky.*—5th, 10th, 14th, 16th, 17th, 23d.  
*Maine.*—4th, 5th, 14th.  
*Massachusetts.*—10th, 11th, 15th, 27th.  
*Michigan.*—6th, 9th, 14th, 16th, 29th.  
*Minnesota.*—8th, 22d.  
*Missouri.*—8th.  
*Montana.*—1st, 5th, 7th.  
*Nevada.*—4th, 5th, 8th, 9th, 14th, 21st.  
*New Jersey.*—17th, 24th, 28th, 29th.  
*New York.*—8th, 9th, 11th, 15th, 17th, 18th, 19th, 21st, 22d, 23d, 25th, 30th.  
*North Carolina.*—4th, 10th, 11th, 18th, 19th, 24th, 25th, 29th.  
*Ohio.*—2d to 5th, 7th, 8th, 9th, 11th, 14th to 18th, 25th, 29th.  
*Oregon.*—4th, 5th, 25th, 27th, 28th.  
*Pennsylvania.*—3d, 10th, 11th, 14th, 15th, 18th, 24th, 30th.  
*South Carolina.*—3d, 4th, 11th, 21st, 25th, 27th, 28th.  
*Tennessee.*—8th, 9th, 10th, 14th, 18th, 25th, 26th, 27th.  
*Texas.*—2d, 11th, 13th.  
*Vermont.*—4th, 30th.  
*Virginia.*—2d, 10th, 11th, 14th, 20th, 24th, 27th, 29th.  
*Washington Territory.*—5th, 6th, 18th, 19th, 21st, 22d, 27th, 28th.  
*Wisconsin.*—6th, 7th, 8th, 17th, 22d.  
*Wyoming.*—1st, 6th, 7th, 9th, 10th, 11th, 13th, 16th, 25th, 29th, 30th.

##### LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

*Arizona.*—10th.  
*Arkansas.*—11th, 16th.  
*California.*—14th, 18th.  
*Colorado.*—13th.  
*Dakota.*—10th, 12th, 13th, 15th.  
*District of Columbia.*—10th, 11th, 12th, 14th, 15th, 19th.  
*Florida.*—11th, 12th, 15th.  
*Georgia.*—10th, 12th.  
*Idaho.*—11th, 16th.  
*Illinois.*—6th, 7th, 9th, 11th, 12th, 15th, 16th, 17th.  
*Indiana.*—1st, 8th, 9th, 13th, 15th, 17th, 18th, 22d, 24th.  
*Iowa.*—12th, 13th, 14th, 23d.  
*Kansas.*—11th, 13th, 14th, 16th.

*Kentucky.*—9th, 10th, 14th, 16th to 19th.

*Louisiana.*—11th.

*Maine.*—12th.

*Maryland.*—10th, 18th.

*Massachusetts.*—3d, 9th, 11th.

*Michigan.*—10th, 11th, 13th, 14th, 16th, 17th.

*Minnesota.*—12th, 14th, 17th.

*Mississippi.*—11th, 13th.

*Missouri.*—11th to 14th.

*Nebraska.*—15th, 16th.

*New Jersey.*—10th, 11th, 12th, 17th.

*New Mexico.*—10th.

*New York.*—9th, 10th, 12th, 14th to 19th.

*North Carolina.*—11th, 12th, 15th, 18th, 19th.

*Ohio.*—12th, 14th to 18th.

*Oregon.*—19th, 22d.

*Pennsylvania.*—9th, 12th, 14th.

*Rhode Island.*—12th.

*South Carolina.*—10th, 16th.

*Tennessee.*—7th, 12th, 13th, 14th, 16th.

*Texas.*—8th to 11th, 13th, 17th, 18th.

*Utah.*—16th.

*Vermont.*—12th, 14th.

*Virginia.*—10th, 11th, 14th, 17th, 18th, 19th.

*Washington Territory.*—11th, 15th, 16th, 25th.

*Wisconsin.*—9th, 13th, 14th, 15th, 17th.

*Wyoming.*—10th, 13th, 14th, 15th.

The phases of the moon (Washington mean time), as given in "The American Ephemeris and Nautical Almanac" for 1886, are as follows: new moon, 3d, 21 h. 22.4 m.; first quarter, 11th, 3 h. 35.8 m.; full moon, 17th, 21 h. 50.9 m.; last quarter, 25th, 12 h. 7.2 m.; apogee, 26th, 11.0 h.; perigee, 14th, 12.4 h.

##### MIRAGE.

Rochester, New York: on the afternoon of the 10th a very distinct mirage was seen at Rochester. Points nine miles distant, including Mount Hope and surroundings, were plainly discernible from the Rome, Watertown, and Ogdensburg Railroad track, near Charlotte. From the same point of view, the Erie Railroad, eight or nine miles distant, with moving train, was plainly seen.

Port Huron, Michigan: a mirage was observed at 5.30 p. m. of the 21st, northeast of this station; miles of ice and several small vessels could be distinctly seen over Lake Huron.

New Haven, Connecticut, 22d: on Long Island Sound vessels appeared elevated much above their actual position and under them their inverted images were seen; low lying land presented to view high bluffs.

Willcox, Arizona: mirage was observed every day during the month.

Mirage was also observed at the following places:

Duluth, Minnesota, 6th, 18th.  
 Mackinaw City, Michigan, 8th, 9th.  
 Oswego, New York, 11th.  
 Marquette, Michigan, 29th.

##### MISCELLANEOUS PHENOMENA.

##### EARTHQUAKE.

Bainbridge Island, Washington Territory: a slight earthquake was felt at 10.05 p. m. on the 16th; it had a tremulous motion and lasted about thirty seconds.

##### INSECTS.

Mr. John F. Bayerly, voluntary observer at Spartanburg, Spartanburg county, South Carolina, reports that grasshoppers have been seen in large numbers since the 15th.

##### METEORS.

Charlotte, North Carolina: a meteor was observed at 11.10 p. m. of the 20th. It descended rapidly at an angle of about 15° from the perpendicular. Meteors were also seen at this place on the 8th and 22d.

Walla Walla, Washington Territory: a large meteor was seen to fall from the heavens about 4.30 a. m. of the 19th, as it